Coil-Over-Plug Kit

EEIG100A

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Safety Information

IMPORTANT SAFETY INSTRUCTIONS

The Coil-Over-Plug Adaptor Kit is intended for use by properly trained, skilled professional automotive technicians. Safety warnings and cautions in this section and throughout this manual are reminders to operator to exercise extreme care when using this test instrument.

There are many variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. Because of the numerous test applications and variations in the products that can be tested with this instrument, ***Snap-on*** cannot possibly anticipate or provide advice or safety messages to cover every situation. It is the automotive technician's responsibility to be knowledgeable of the system being tested. It is essential to use proper service methods and test procedures and to perform tests in an appropriate and acceptable manner that does not endanger your safety, safety of others in the work area, or vehicle or equipment being tested.

It is assumed the operator has a thorough understanding of vehicle systems before using the Coil-Over-Plug Adaptor Kit. Understanding of these system principles and operating theories is necessary for competent, safe and accurate use of this test.

Before using the Coil-Over-Plug Adaptor Kit always refer to and follow safety messages and applicable test procedures provided by the manufacturer of the vehicle or equipment being tested.

Use equipment only as described in this manual.

Read All Instructions

Read, understand and follow all safety messages and instructions in this manual and on the test equipment. Safety messages in this section of the manual contain a signal word with a three-part message and, in some instances, an icon.

The signal word indicates level of hazard in a situation.

- **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury to operator or bystanders.
- **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to operator or bystanders.
- **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury to operator or bystanders.

Safety messages in this section contain three different type styles.

- Normal type states the hazard.
- **Bold type** states how to avoid the hazard.
- *Italic type* states the possible consequences of not avoiding the hazard.

An icon, when present, gives a graphical description of the potential hazard.

IMPORTANT SAFETY INSTRUCTIONS

⚠DANGER

Risk of poisoning.

- **Use equipment in locations with mechanical ventilation providing at least four air changes per hour. Engine exhaust contains carbon monoxide gas, a colorless, odorless lethal gas.**
- **Route exhaust outside while testing with engine running.**

Poisoning can result in death or serious injury.

Risk of fire.

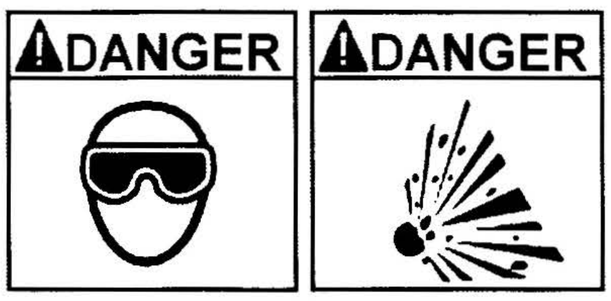
- **Wear safety goggles and protective clothing, user and bystander.**
- **Do not position head directly over or in front of carburetor or throttle body. Do not pour gasoline down carburetor or throttle body when cranking or running engine, when working with fuel delivery systems or any open fuel line. Engine backfire can occur when air cleaner is out of normal position.**
- **Do not use carburetor sprays or fuel injector cleaning solvents when performing diagnostic testing.**
- **Keep a fire extinguisher rated for gasoline, chemical and electrical fires in work area.**

Fire can cause death or serious injury.

Risk of electric shock.

- **Do not touch ignition coils, coil terminals and spark plugs while operating. Ignition coils, coil terminals and spark plugs emit high voltages.**
- **Use extreme care when working around spark plugs, spark plug wires, and coil terminals while engine is running.**
- **Do not puncture an ignition wire to connect test equipment, unless specifically instructed by vehicle or equipment manufacturer.**
- **Turn off engine before connecting or disconnecting the secondary lead pickup or trigger lead.**
- **Do not use any test lead, pickup or adaptor, other than those intended for use with this product.**

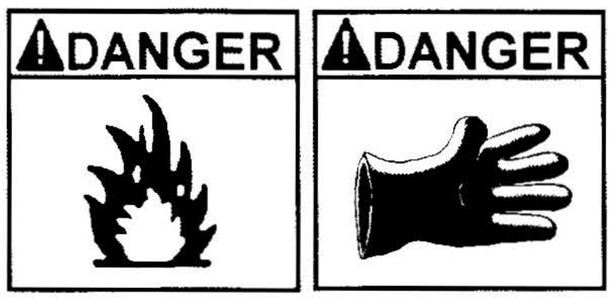
Electric shock can cause death or serious injury.



Risk of explosion.

- **Wear safety goggles and protective clothing, user and bystander.**
- **Use this equipment in locations with mechanical ventilation providing at least four air changes per hour.**
- **Avoid sparks when connecting or disconnecting power leads to battery.**
- **Avoid making accidental connection between battery terminals through tools, jumper leads, etc.**

Explosion can cause injury.



Risk of burns.

- **Do not touch hot exhaust systems, manifolds, engines, radiators, sample probe, etc.**
- **Wear gloves when handling hot engine components.**
- **Do not place test equipment or tools on fenders or other places in the engine compartment. Engine compartment contains electrical connections.**
- **Keep yourself, test equipment, clothing and other objects clear of electrical connections.**

Burns can cause injury.

Risk of entanglement.

Keep yourself, clothing and test equipment clear of moving parts.

Entanglement in moving parts can cause injury.

⚠WARNING

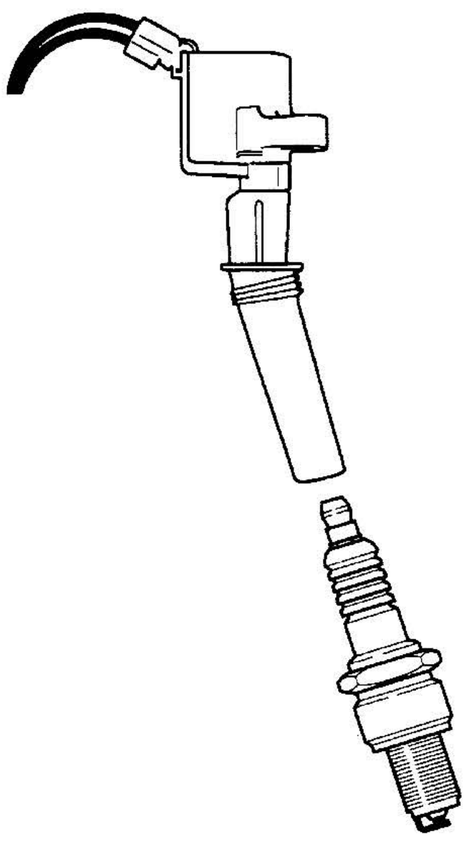
A test vehicle may move if not properly prepared.

- **Block the front and rear of drive wheels before performing a test with the engine running.**
- **Unless otherwise instructed, set the parking brake and gear selector in neutral for a standard transmission or park for an automatic transmission. If the vehicle has an automatic parking brake release, disconnect the release mechanism for testing and reconnect when testing is completed.**
- **Do not leave a running vehicle unattended.**

A moving vehicle can cause death or injury.

SAVE THESE INSTRUCTIONS

Introduction



Use the Coil-Over-Plug adaptor on vehicles that have one coil for each spark plug to pick up and display the secondary ignition.

The adaptor provides a way of connecting to the new coil-on-plug technology in many of today's vehicles. The Coil-Over-Plug adapter uses pickups to sense high voltage from the coil. The signal from the pickups goes to the Coil-Over-Plug adapter and displays on the analyzer screen.

Because there are no secondary wires to connect the cylinder #1 trigger, a stable source of cylinder #1 reference is required for diagnostic testing. This adaptor provides a stable #1 cylinder signal when the trigger pickup is connected to the coils low voltage primary circuit. The trigger loop on the adaptor provides a signal that works with many conventional pickups.

✓ Many cylinder #1 trigger pickups do not detect a stable signal when connected directly to the primary circuit of a coil.

Functional Description

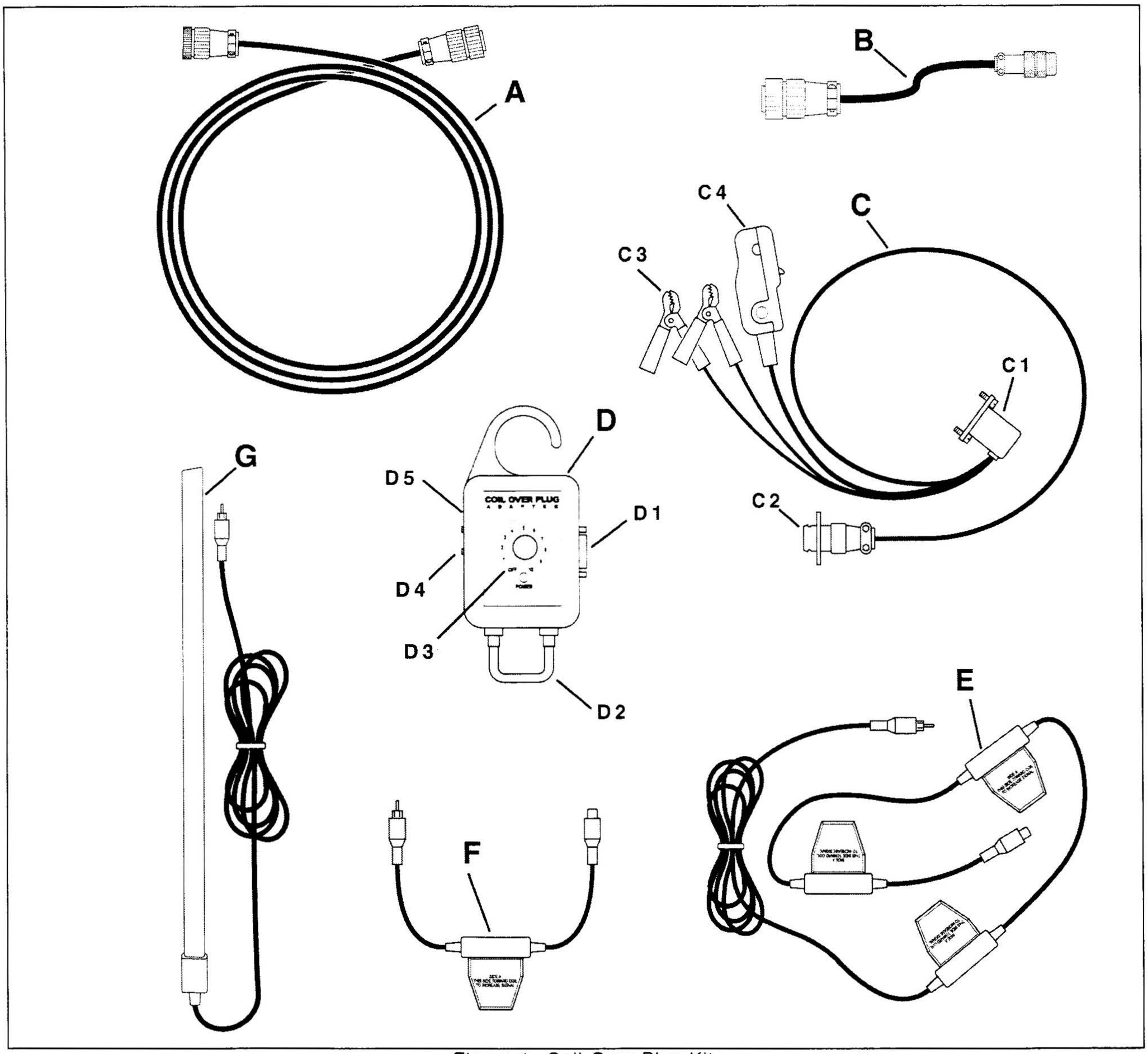


Figure 1: Coil-Over-Plug Kit

A—*Sun Machine* Secondary Lead

Part number 6-1222. Connects the coil-over-plug secondary lead (C2) to the ***Sun Machine***.

B—*Sun SG* Secondary Lead Adaptor

Part number 6-1122. Connects the coil-over-plug secondary lead (C2) to the ***Sun SG*** secondary lead.

C—Coil-Over-Plug Lead Assembly

Part number 6-1022. Connects coil-over-plug adaptor (D) to engine, tester and power.

- C1, coil-over-plug adaptor harness connector
- C2, coil-over-plug secondary lead (out)
- C3, battery leads
- C4, trigger pickup (not used with ***Counselor II, Counselor III***, ***SST1500*** or ***Autoscope 1700***)

D—Coil-Over-Plug Adaptor

Part number EEIG100A00. Use with flag or stick pickups (E, F, or G) to display secondary ignition signal on a tester.

- D1, lead assembly connector
- D2, trigger pickup loop (not used with ***Counselor II, Counselor III***, ***SST1500*** or ***Autoscope 1700***)
- D3, gain knob
- D4, RCA ports
- D5, range (HIGH/LOW) switch

E—Three Flag Pickup Set (2)

Part number EAC0056L02A. Position next to coil to pick up secondary ignition signal.

✓ Pickups are directional with sides marked "A" and "B." Refer to *Application Chart* on page *COP-8* to determine which side of the pickup should face the coil.

F—Single Flag Pickup Set (2)

Part number EAC0056L00A. Position next to coil to pick up secondary ignition signal.

✓ Pickups are directional with sides marked "A" and "B." Refer to *Application Chart* on page *COP-8* to determine which side of the pickup should face the coil.

G—Stick Pickup (2)

Part number EAC0056L03A. Place on a bank of coils to pick up secondary ignition signal.

✓ Pickups are directional with sides marked "A" and "B." Refer to *Application Chart* on page *COP-8* to determine which side of the pickup should face the coil.

Typical Coil-Over-Plug Lead Connections

✓ Refer to *Application Chart* on page *COP-8* for typical vehicle connection configurations.

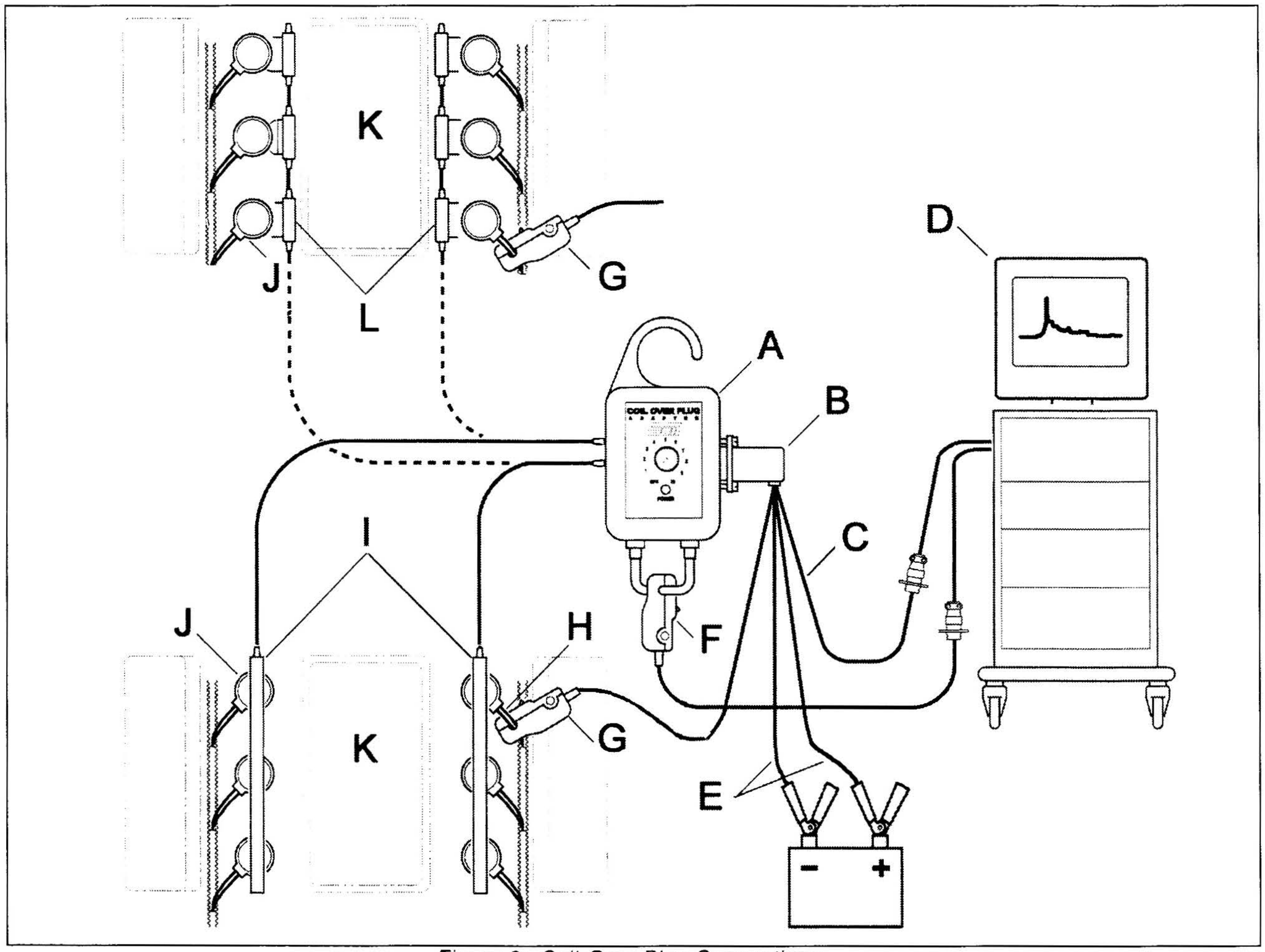


Figure 2: Coil-Over Plug Connections

A – Coil-Over-Plug Adaptor
B – Coil-Over-Plug Adaptor Harness Assembly
C – Coil-Over-Plug Secondary Lead
D – Tester
E – Battery Leads
F – Tester Trigger Pickup
G – Coil-Over-Plug Trigger Pickup
H – Coil Primary Wires
I – Stick Pickups
J – Coil
K – Engine
L – Flag Pickups

Application Chart

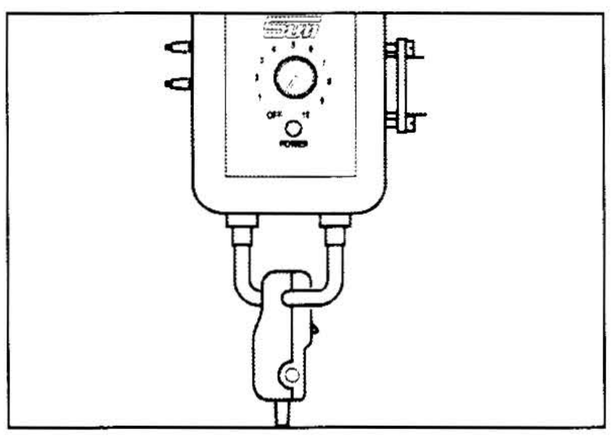
Vehicle Make	*Engine*	*Pickup Type*	*Pickup Side*	*Range*	*Gain Setting*	*See Figure*
Sun Machine						
Ford	4.6L, 5.4L SOHC V8	sticks	B	High	4	*Figure 3*
Ford	4.6L, 5.4L DOHC V8	flags	B	Low	3	*Figure 4*
Chrysler	2.7L DOHC V6	sticks	B	Low	7	*Figure 5*
Chrysler	3.2L, 3.5L DOHC V6	sticks	B	Low	3.5	*Figure 5*
Snap-on Counselor II and Counselor III, Sun SST1500 and Autoscope 1700						
Ford	4.6L, 5.4L SOHC V8	sticks	A	High	6.5	*Figure 3*
Ford	4.6L, 5.4L DOHC V8	flags	A	High	4	*Figure 4*
Chrysler	2.7L DOHC V6	sticks	A	High	5.5	*Figure 5*
Chrysler	3.2L, 3.5L DOHC V6	sticks	A	High	2	*Figure 5*
Sun SG						
Ford	4.6L, 5.4L SOHC V8	sticks	B	High	5.5	*Figure 3*
Ford	4.6L, 5.4L DOHC V8	flags	B	Low	3	*Figure 4*
Chrysler	2.7L DOHC V6	sticks	B	Low	9	*Figure 5*
Chrysler	3.2L, 3.5L DOHC V6	sticks	B	Low	7	*Figure 5*

Lead Connections

Refer to *Figure 2* for typical lead connection configurations.

1. Connect the coil-over-plug harness assembly (B) to the coil-over-plug adaptor (A).
2. Connect the coil-over-plug trigger pickup (G) to the #1 coil primary wires (H).
   — The ***Counselor II***, ***Counselor III***, ***SST1500*** and ***Autoscope 1700*** connect directly to the vehicle and the coil-over-plug trigger pickup is not used.
3. Connect the battery leads (E) to the vehicle battery.

✓ Connect both the adapter and host tester battery leads directly to the vehicle battery when possible.
   — If the vehicle battery is not accessible, connect all battery leads to the same terminal.
   — If it is not possible to connect all battery leads to the terminal, connect the tester leads first. Then connect the coil-over-plug adapter leads to the tester leads.
   — Altenator ripple measurements may be inaccurate if leads are not connected in this order.

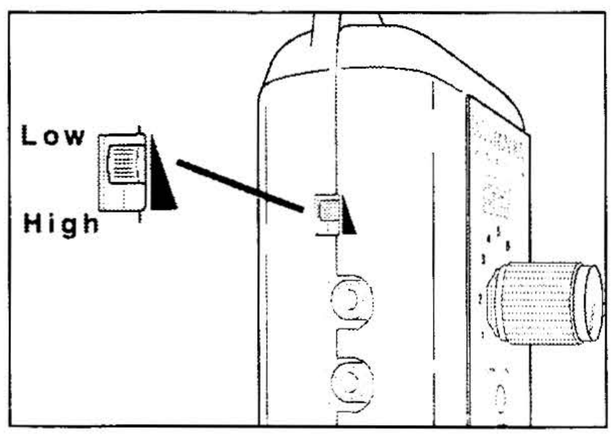


4. Connect the coil-over-plug adaptor secondary lead as follows:
   — ***Sun Machine***, to the tester using the secondary lead, part number 6-1222
   — ***Counselor II***, ***Counselor III***, ***SST1500*** and ***Autoscope 1700*** directly to the tester secondary lead
   — ***Sun SG***, to the tester secondary lead using secondary lead adaptor, part number 6-1122

5. Connect stick or flag pickup leads to RCA ports on the coil-over-plug adaptor.

6. Connect the tester trigger pickup to the coil-over-plug adapter loop.

✓ The ***Counselor II***, ***Counselor III***, ***SST1500*** and ***Autoscope 1700*** trigger pickup connect directly to the vehicle and the coil-over-plug trigger pickup is not used.



7. Using the range switch, select HIGH or LOW. Refer to the *Application Chart* on page *COP-8* for settings.

8. Adjust the signal level for your tester with the gain knob. Refer to the *Application Chart* on page *COP-8* for additional information.
   — Rotating the knob from the off position turns on power to the coil-over-plug adaptor.

Typical Vehicle Connections

Ford SOHC V8, Stick Pickup

Place the pickup directly next to the valve cover side of the coils.
— Slide the pickup into position from the front of the vehicle, using one pickup for each side of the engine.
— Pickups are directional with sides marked "A" and "B." Refer to *Application Chart* on page *COP-8* to determine which side of the pickup should face the coil.
— Pickups must contact each coil in the same place for consistent test results.

✓ It may be necessary to secure the pickup if it does not remain in position.

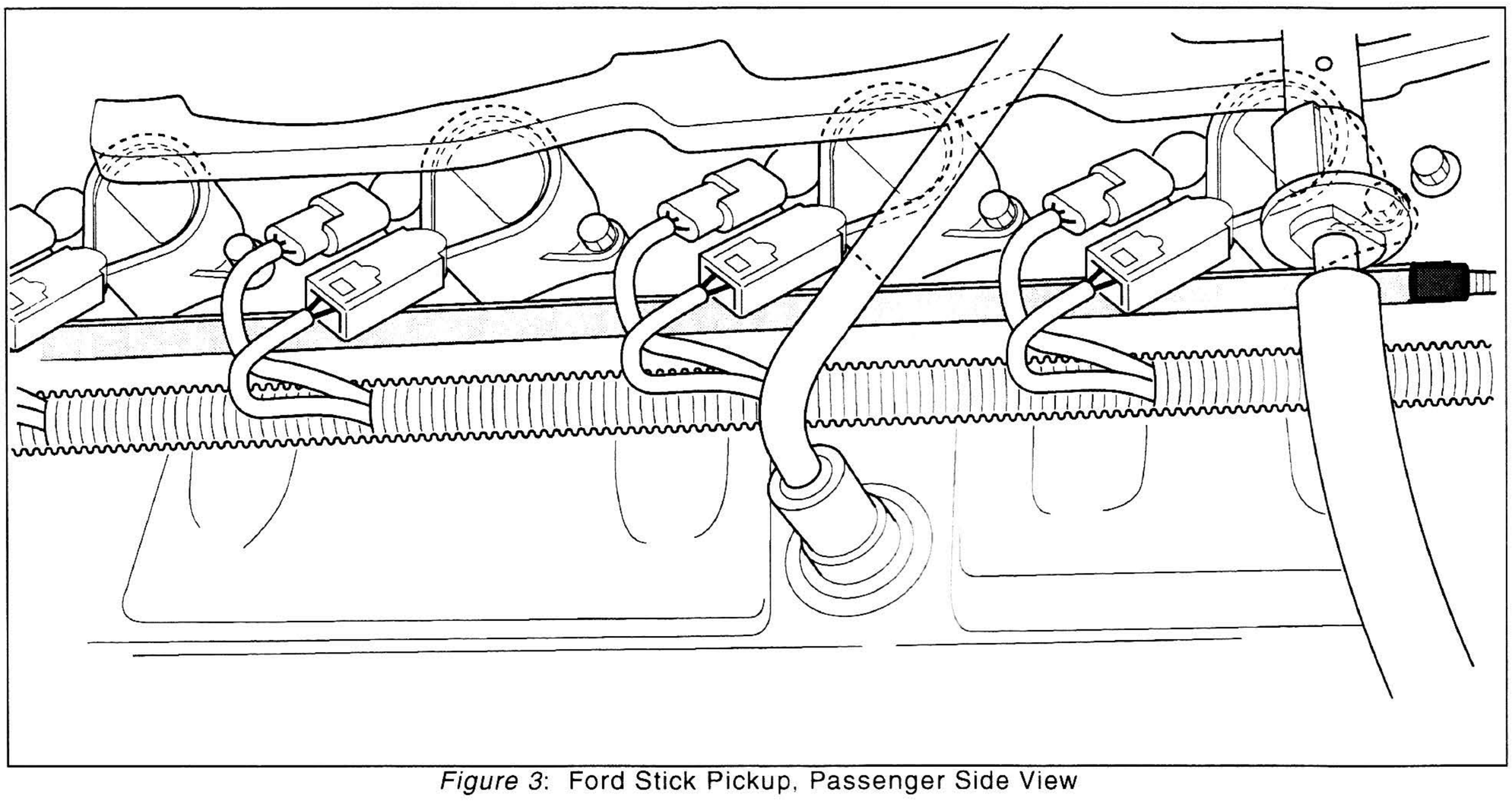


Figure 3: Ford Stick Pickup, Passenger Side View

Ford DOHC V8, Flag Pickups

1. Connect the single flag pickup (F) to the end of a 3 flag pickup set (E).

2. Place one flag along the side of each coil.

✓ Pickups must contact each coil in the same place for consistent test results.

✓ Pickups are directional with sides marked "A" and "B." Refer to *Application Chart* on page *COP-8* to determine which side of the pickup should face the coil.

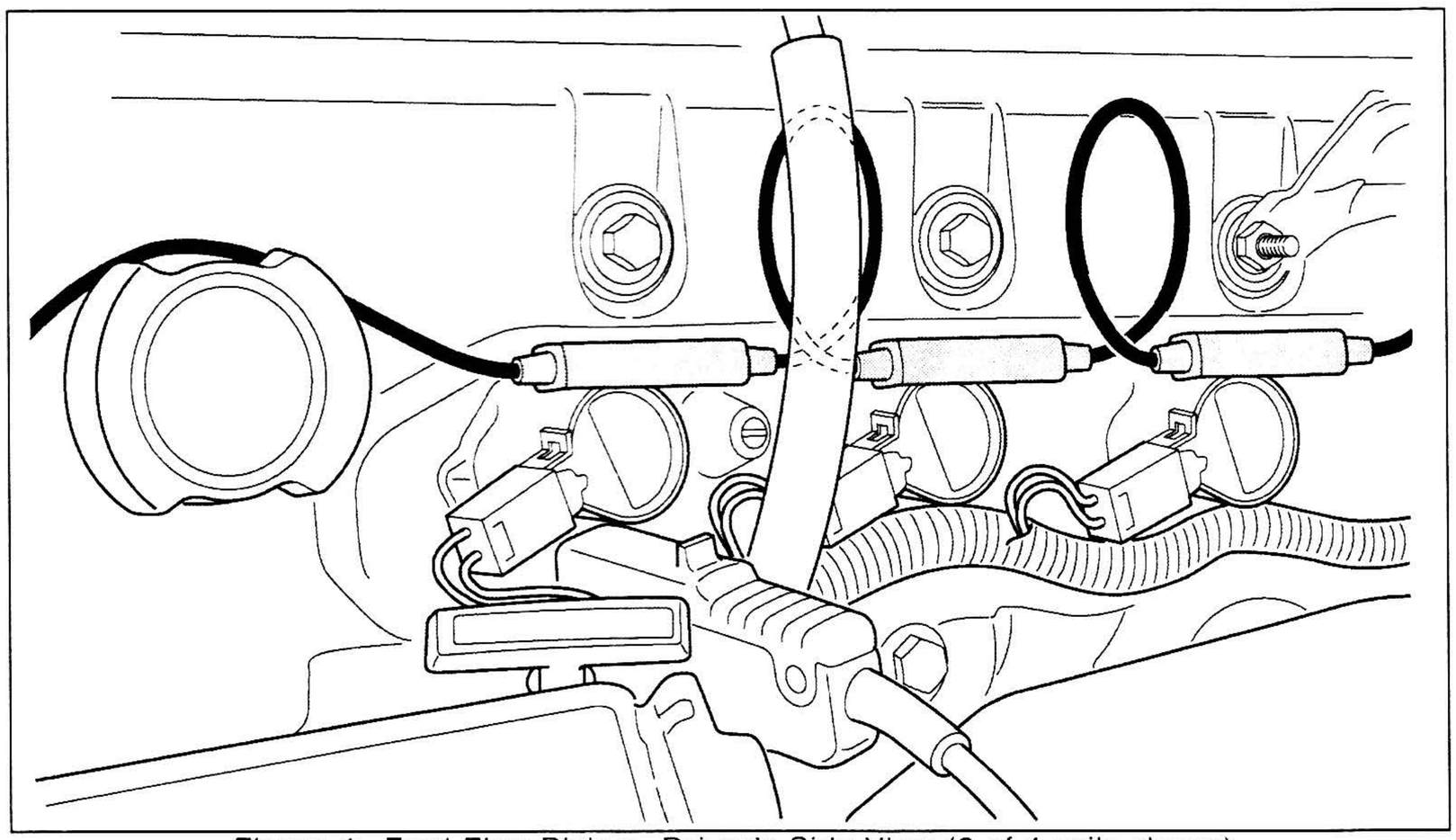


Figure 4: Ford Flag Pickup, Driver's Side View (3 of 4 coils shown)

Chrysler SOHC V6, Stick Pickup

Place the pickup directly on top of the coils.

— Use one pickup for each side of the engine.
— Pickups are directional with sides marked "A" and "B." Refer to *Application Chart* on page *COP-8* to determine which side of the pickup should face the coil.
— Pickups must contact each coil in the same place for consistent test results.

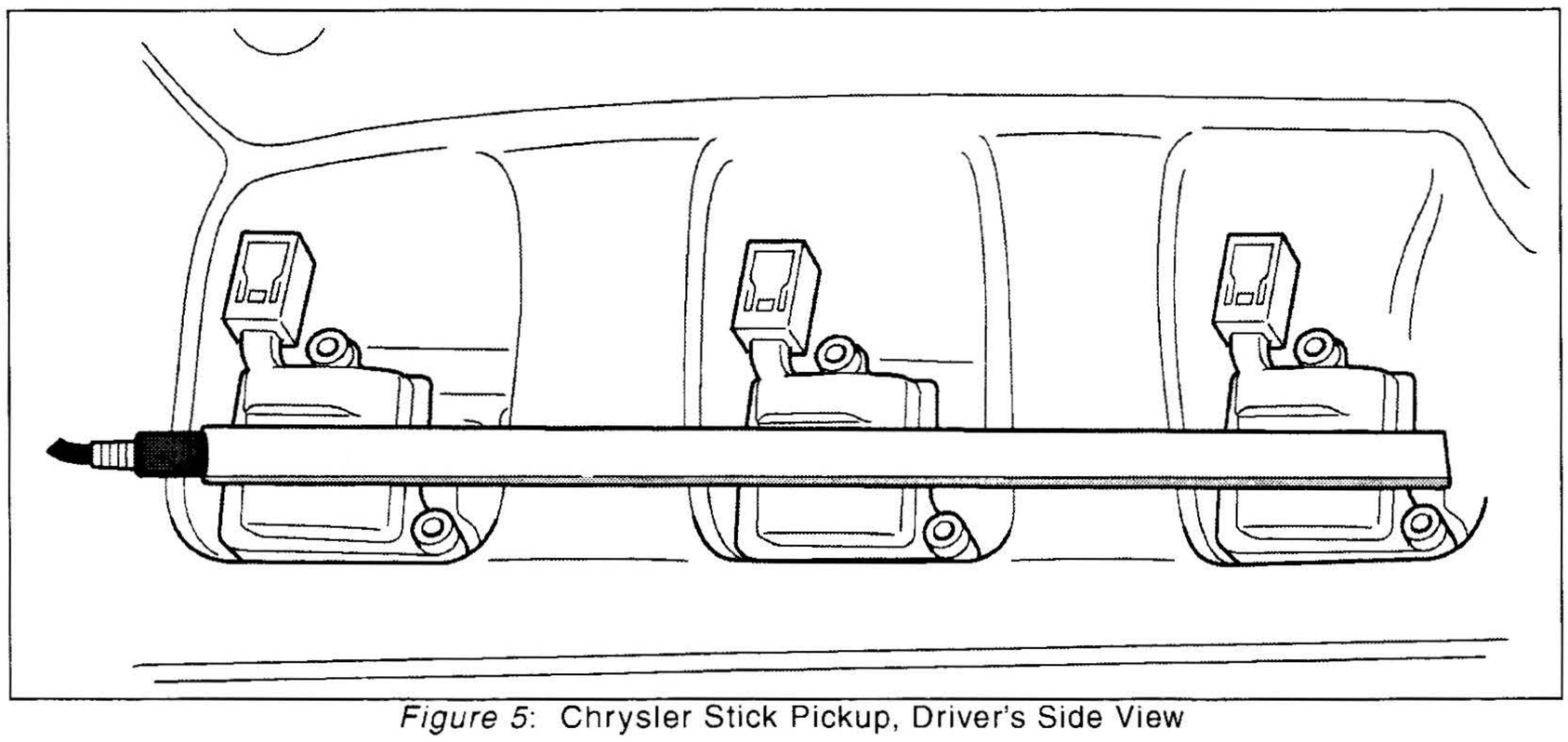


Figure 5: Chrysler Stick Pickup, Driver's Side View

Test Preparation

Perform the following setup before starting the test:

- Tester is on, warmed up and calibrated,
- Leads connected to the coil-over-plug adaptor and the vehicle,
- Vehicle identified using Vehicle ID:
  — Description,
  — Quick ID, or
  — Restore Data.
- Gear selector is in:
  — Neutral, if equipped with a manual transmission, or
  — Park, if equipped with an automatic transmission.
- Drive wheels are blocked,
- Parking brake is set, and
  — If vehicle equipped with automatic parking brake release, disable release mechanism.
- All testing tips and safety requirements are observed.

Testing Tips

❒ If the gain adjustment on the coil-over-plug adapter is set correctly, the firing kV on most vehicles average between 12–16 kV. Refer to the *Application Chart* on page *COP-8* for settings. Gain settings are "typical" for the vehicles listed and may need to be adjusted. Gain adjustments may be necessary:
— Depending on exact location of pickup
— If non-OEM coils have been substituted.

✓ Aftermarket coils may exhibit stronger or weaker signals than OEM coils due to the location of the windings inside of the coil. This difference in itself does not indicate a bad coil, but must be taken considered when diagnosing the vehicle.

❒ Waveforms collected with the coil-over-plug adapter can be analyzed like all other conventional secondary ignition waveforms.
— Higher spark voltage has shorter duration, lower spark voltage has longer duration. Relative measurements are more important than absolutes.
— It is more important to compare cylinders to each other and look for noticeable differences.

✓ Refer to *Ignition Waveform Description* on page *COP-22* for details of the relationship between the primary and secondary ignition circuits.

❒ Should #1 trigger pickup problems occur, move the pickup farther from the coil, if possible. This may reduce unwanted ignition "noise" detection.

❒ Firing kV vary as much as ±50% the average firing value. This variation, in itself, does not indicate a problem.
— Examine both the spark voltage and burn time (duration).

❒ ***Digital kV readings and Bar graphs:***
— If measurements show unusual variations like extremely wide range between minimum and maximum readings, verify system operation with the ignition scope. This is especially the case if duration readings jump from the typical 1–2ms to 3 ms or more.

❒ Many coils have diodes in the secondary circuit and the secondary resistance on these coils can not be measured. Refer to manufacturer specifications for information about these coils.

❒ Coil oscillations on coil-over-plug systems may be lower than coil oscillations of previous systems. In some cases normal oscillations may be as low as zero. Compare each vehicle coil with others on the vehicle to identify a problem coil.

❒ If a vehicle seems to have an ignition miss but the miss is not obvious in the secondary waveform pattern, check the secondary insulator connecting the coil to the plug.

✓ When coil insulation breaks down the spark can arc to ground. The resulting spark waveform may appear very similar to a spark plug gap waveform.
— Check the spark line on all cylinders. Suspect any that are smooth, less turbulent, or with a different slope. Sparks that occur outside the combustion chamber are typically more stable than sparks that occur in the combustion chamber.
— Histograms are excellent for diagnosing this type of problem, especially with a snap-throttle.

Test

1. Select Scope,
   — Ignition Scope,
   — Secondary Pattern
2. Start engine.
3. Observe and interpret waveform.

✓ Refer to *Figure 6*, *Figure 7* and *Figure 8* for gain setting examples.

✓ If the tester mistriggers or the pattern is unstable, refer to *Troubleshooting Coil-Over-Plug Adaptor and Tester Lead Connections* on page *COP-17*.

Gain Set Correctly

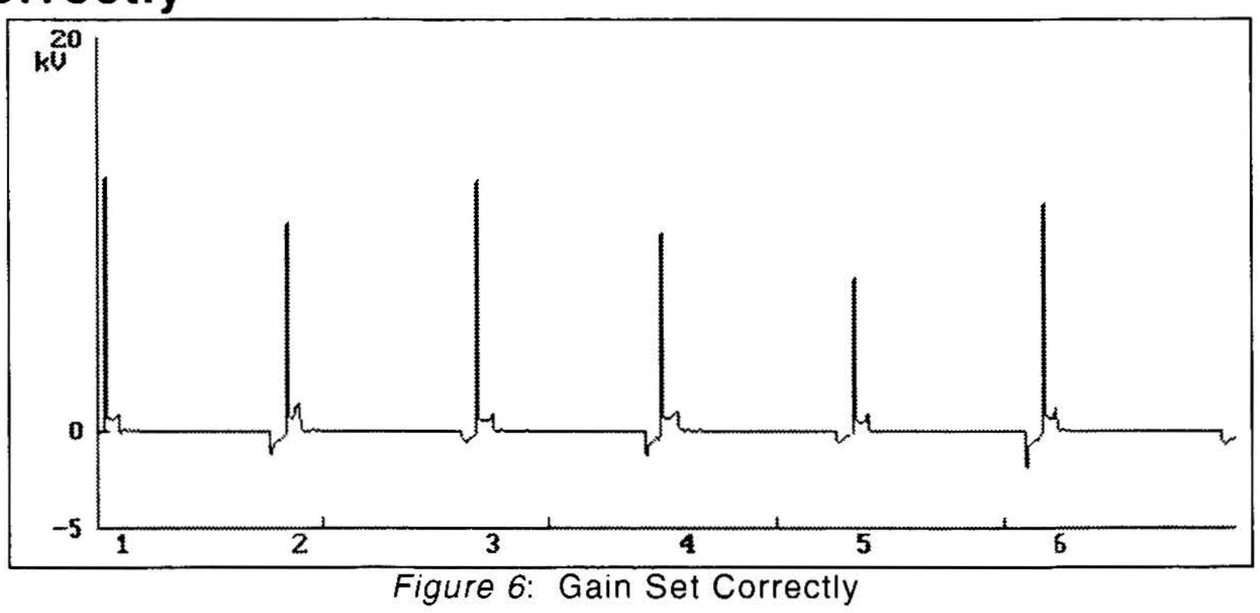


Figure 6: Gain Set Correctly

Display

— The firing kV on most vehicles average between 12–16 kV.
— Firing line visible on all cylinders.

Gain Too High

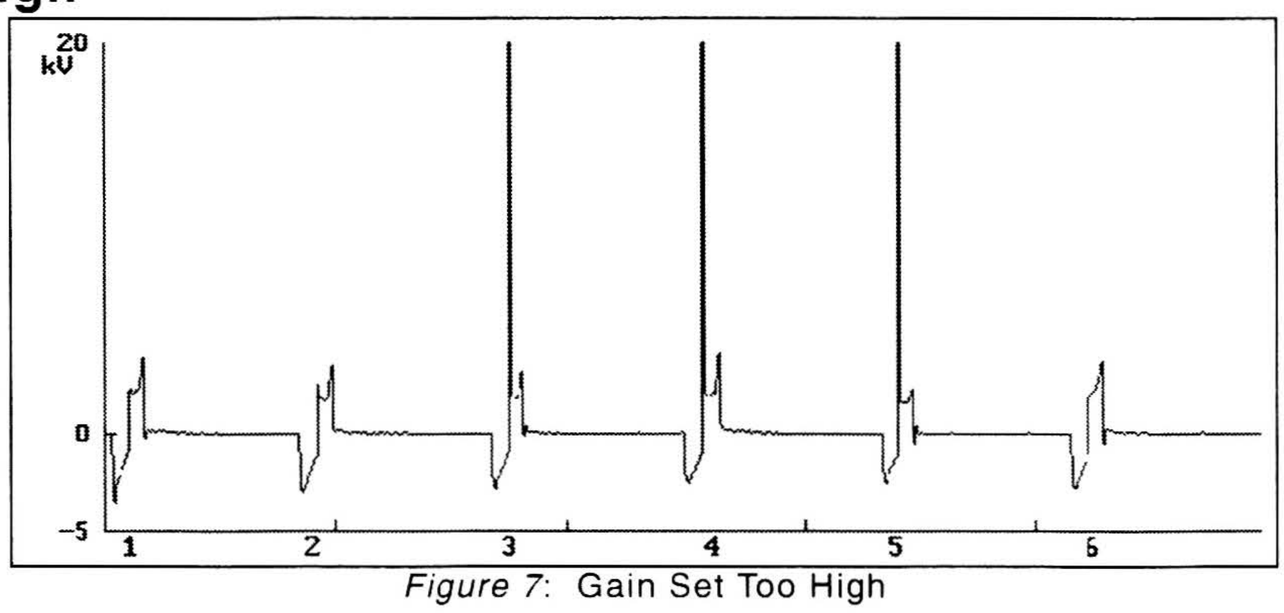


Figure 7: Gain Set Too High

Display

— Firing and spark voltage, extremely high.
— Spark duration normal, typically in the range of 1–2 ms.
— Firing kV is unusually high.
— Some or all cylinders may be missing the firing line.

Adjustment

Decrease gain using rotary knob until firing kV averages 12–16 kV.

✓ Vehicles with high mileage on the spark plugs may have significantly higher firing and spark voltages. Do not readjust the gain before checking both the spark kV and duration (burn time.
— If spark duration is very short and spark kV is very high, there may be excessive resistance in the secondary circuit. This is a vehicle problem and the gain does not need to be adjusted
— If spark duration is normal, adjust the gain until the firing kV is between 12–16 kV.

Gain Too Low

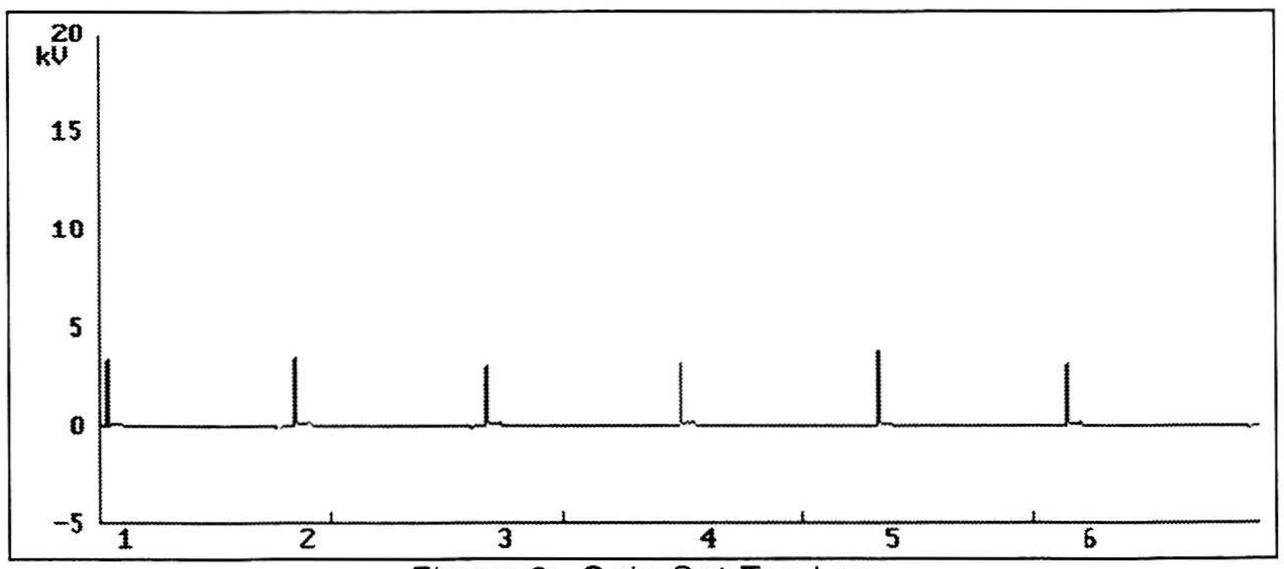


Figure 8: Gain Set Too Low

Display

— Firing and spark voltage, extremely low.
— Spark duration typically in the range of 1–2 ms.
— Spark and dwell sections, hardly distinguishable from the baseline.

Adjustment

Increase gain using rotary knob until firing kV averages 12–16 kV.

Ignition Waveform Examples

The waveform examples in this section show typical good secondary ignition waveforms that may be used for reference during analysis and interpretation. Refer to *Ignition Waveform Description* on page *COP-22* for details of the relationship between the primary and secondary ignition circuits.

Typical Ford V8 Patterns

Ford engines use a multi-spark strategy at idle. The system typically:

- — Reverts to single spark mode at speeds between 1000–1400.
- — Produces up to three (3) sparks for each cylinder, depending on conditions.

The first sparks have a fixed duration of .5 ms. At .5 ms the primary turns on, the spark stops, and the coil charges again. The last spark is sustained until all the energy in the coil is used.

✓ Digital kV measurements are taken from the first spark when the engine is in single spark mode. Spark duration is approximately .5 ms.

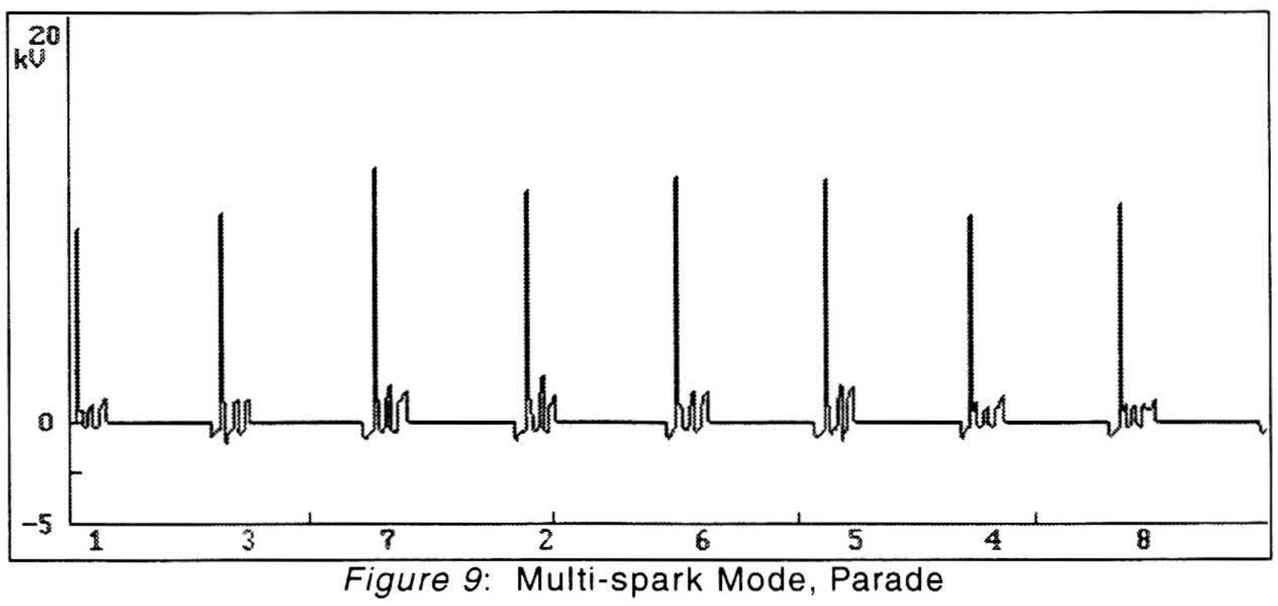


Figure 9: Multi-spark Mode, Parade

Figure 9 shows a parade pattern of all cylinders with the system in multi-spark mode at idle.

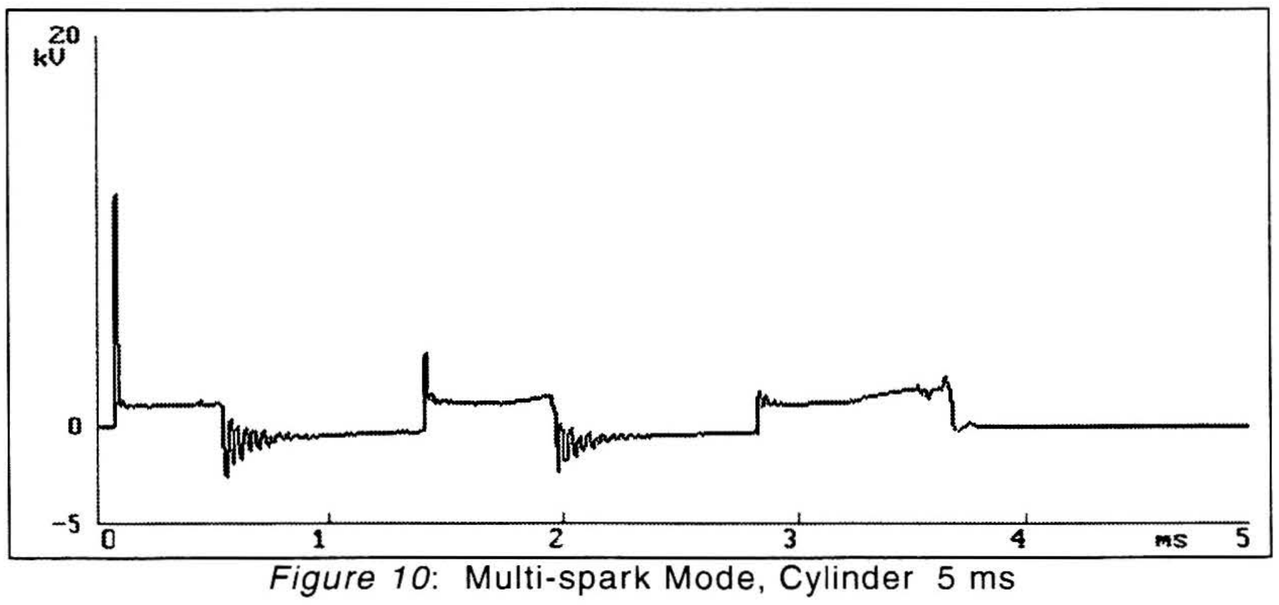


Figure 10: Multi-spark Mode, Cylinder 5 ms

Figure 10 shows one cylinder in multi-spark mode at idle. Duration of the first two sparks is 5 ms and the last spark is sustained until all energy from the coil is expended.

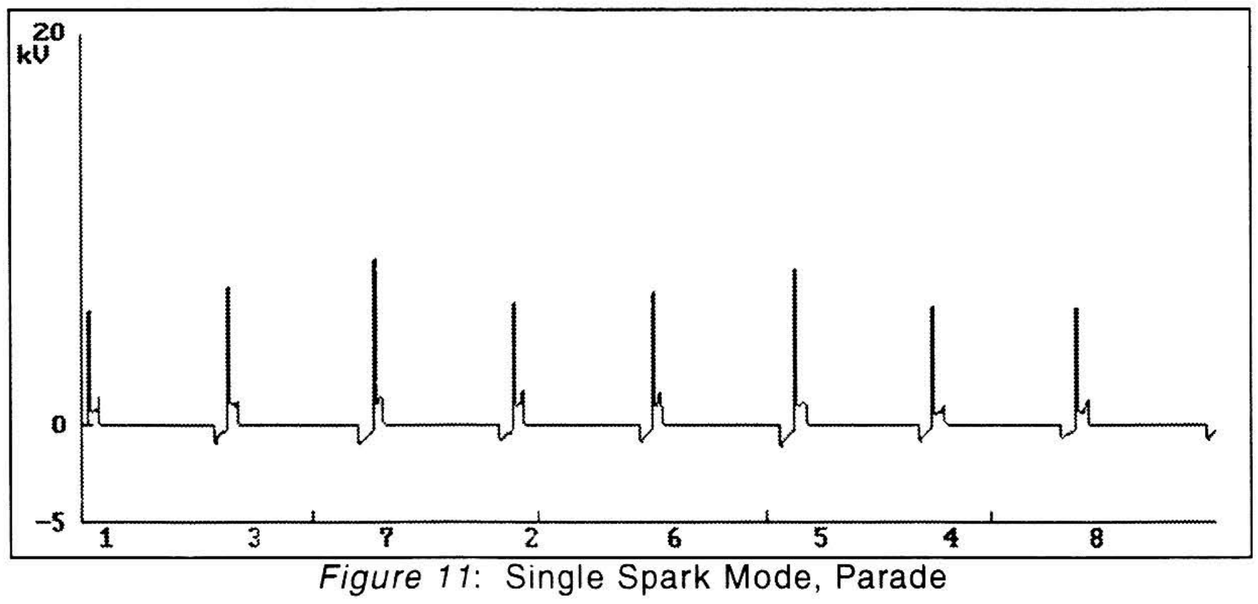


Figure 11: Single Spark Mode, Parade

Figure 11 shows a parade pattern of all cylinders with the system in single spark mode.

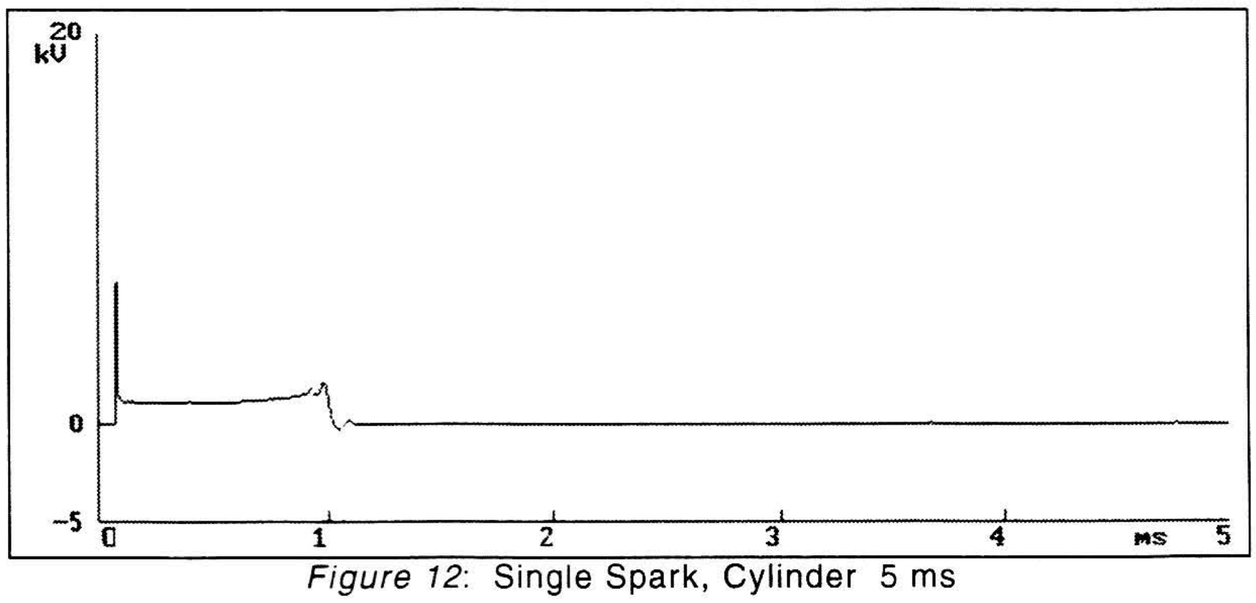


Figure 12: Single Spark, Cylinder 5 ms

Figure 12 shows a close-up view of one cylinder with the system in single spark mode.

Typical Chrysler V6 Patterns

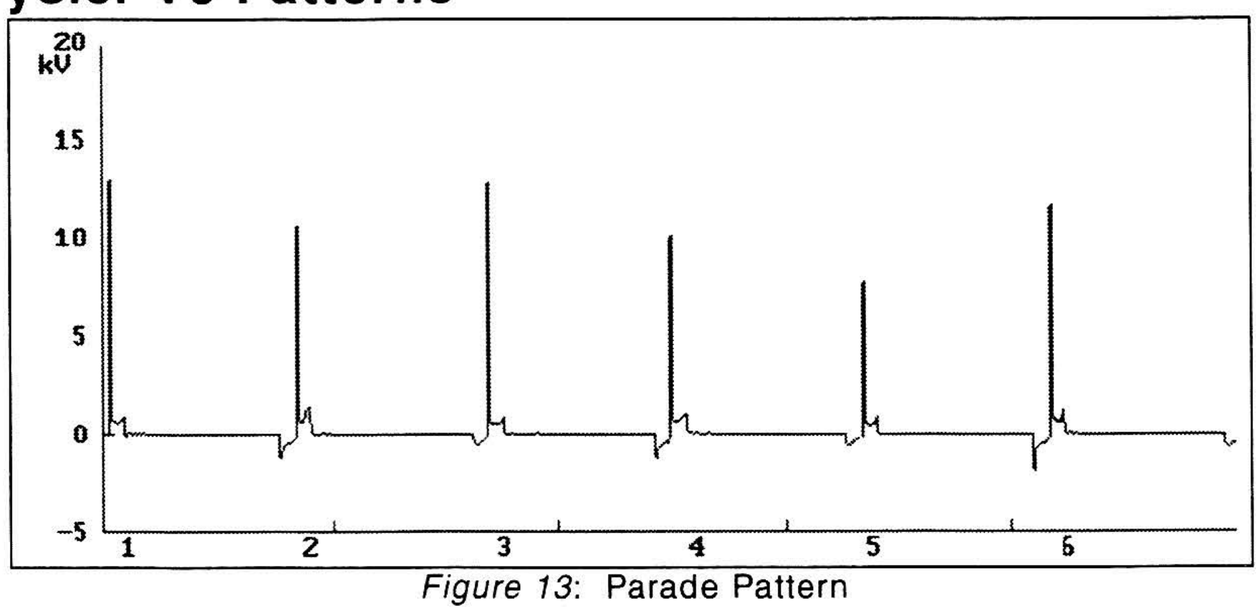


Figure 13: Parade Pattern

Figure 13 shows parade pattern of all cylinders at idle.

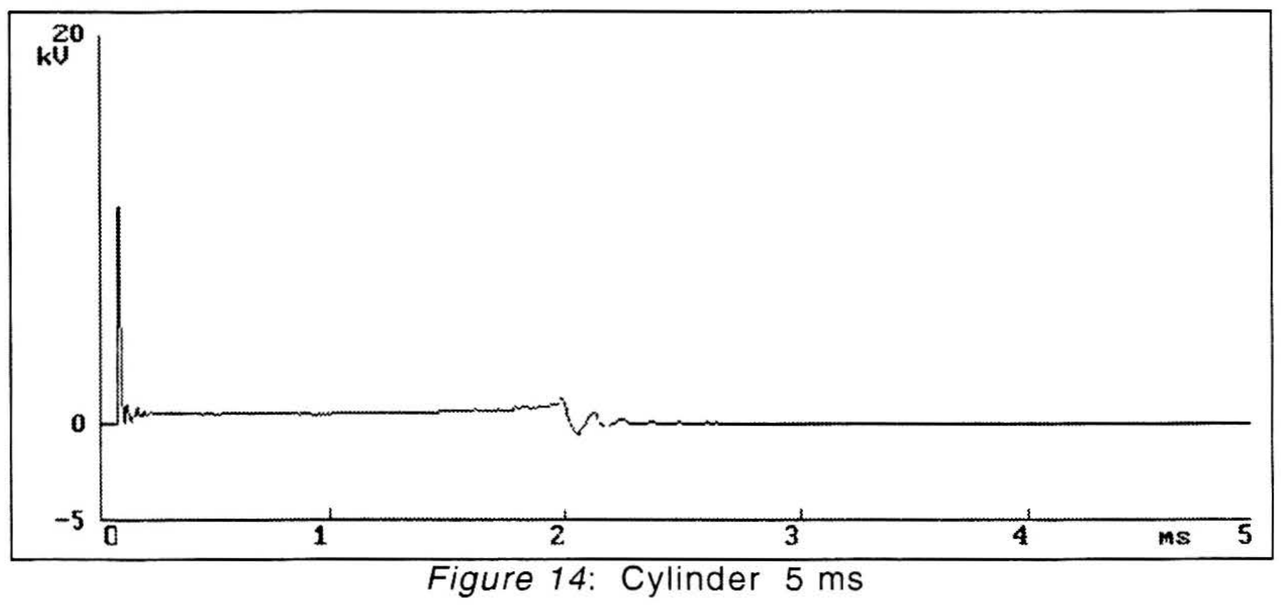


Figure 14: Cylinder 5 ms

Figure 14 shows a close-up view of one cylinder at idle.

Troubleshooting Coil-Over-Plug Adaptor and Tester Lead Connections

This section addresses some of the common problems that may occur during testing with the coil-over-plug adapter. There are waveform examples for these problems, followed by recommended solutions.

Triggering Problems or Unstable Patterns

For problems at any speed, including cranking, check:

- All lead connections,
- Correct positioning for secondary pickups,
- Good connections for all tester ground(s), and
- Gain settings match *Application Chart*.

✓ Refer to *Ignition Waveform Description* on page *COP-22* for details of the relationship between the primary and secondary ignition circuits.

Problem 1

Some or All Firing Lines Missing

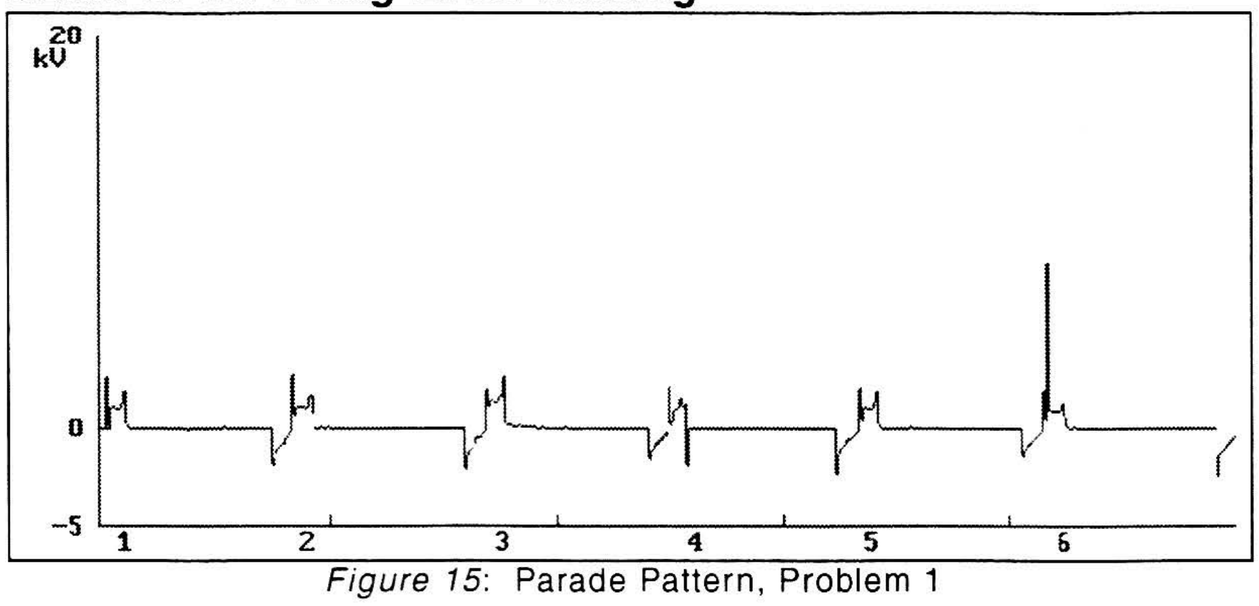


Figure 15: Parade Pattern, Problem 1

— Firing lines disappear intermittently, especially when engine speed is changed.

Problem 2

Pattern Starts with Current Limiting

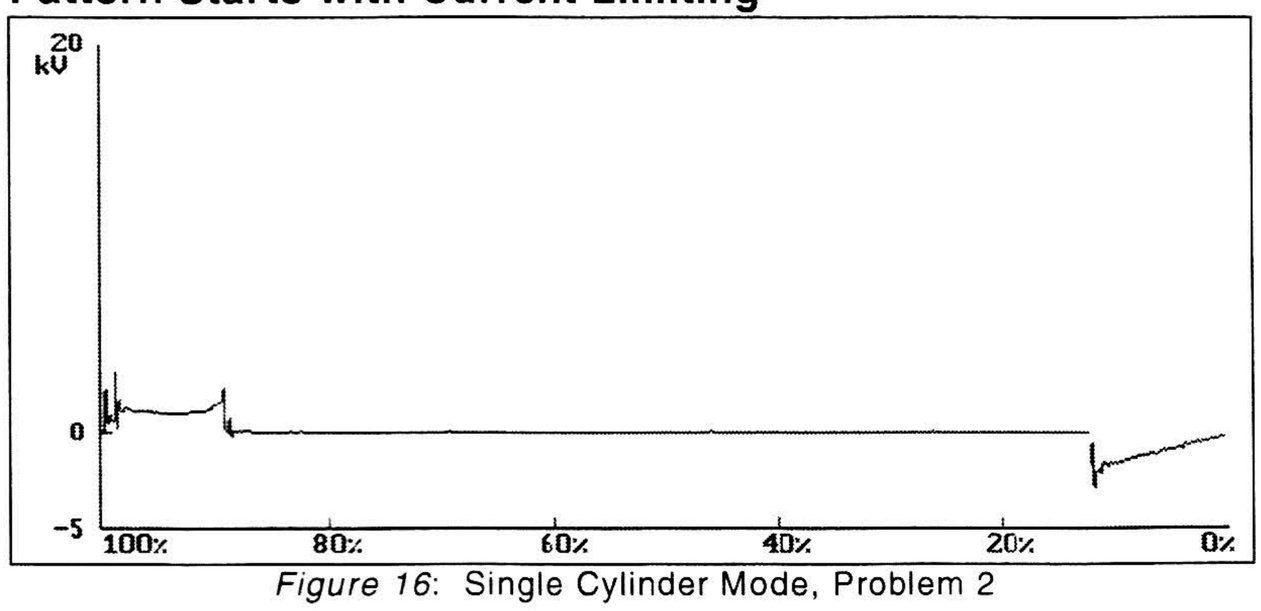


Figure 16: Single Cylinder Mode, Problem 2

— Tester triggered on the current limiting, firing line may be missing and firing section shifted to the right.

Problem 3

Pattern Starts with Dwell

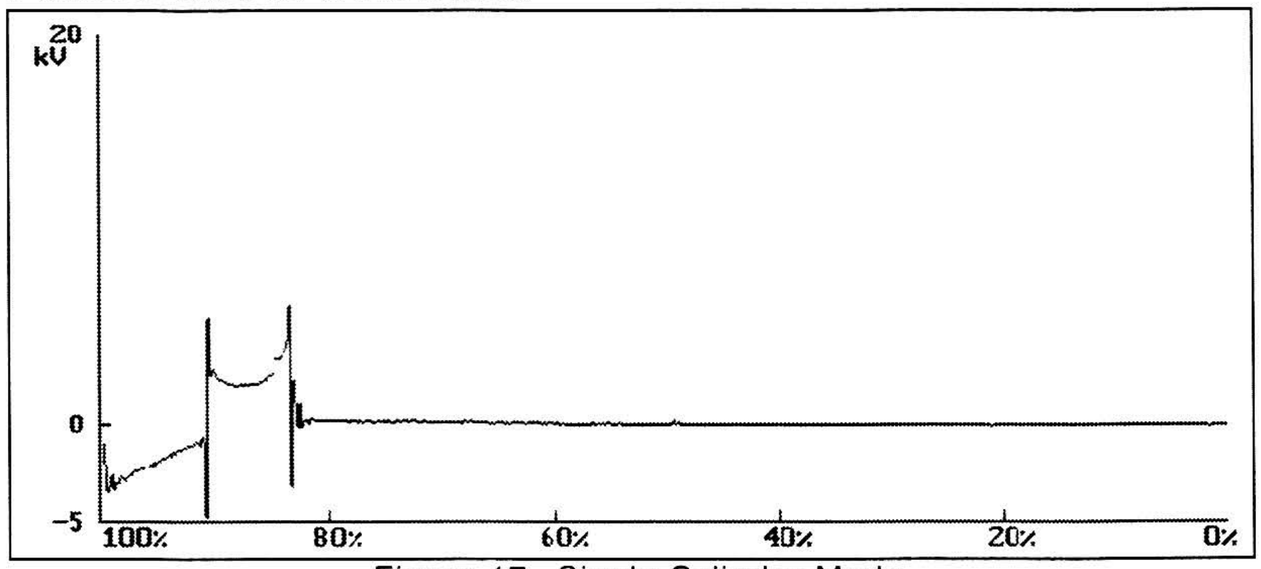


Figure 17: Single Cylinder Mode

— Tester triggered on the start of dwell, firing line may be missing and firing section shifted to the right.

Solution, Problem 1, 2 and 3

— Decrease gain until all firing lines display on the left side of the screen. Make this adjustment while viewing a raster pattern to view all cylinders.

Problem 4

Firing Lines Small on Some Cylinders

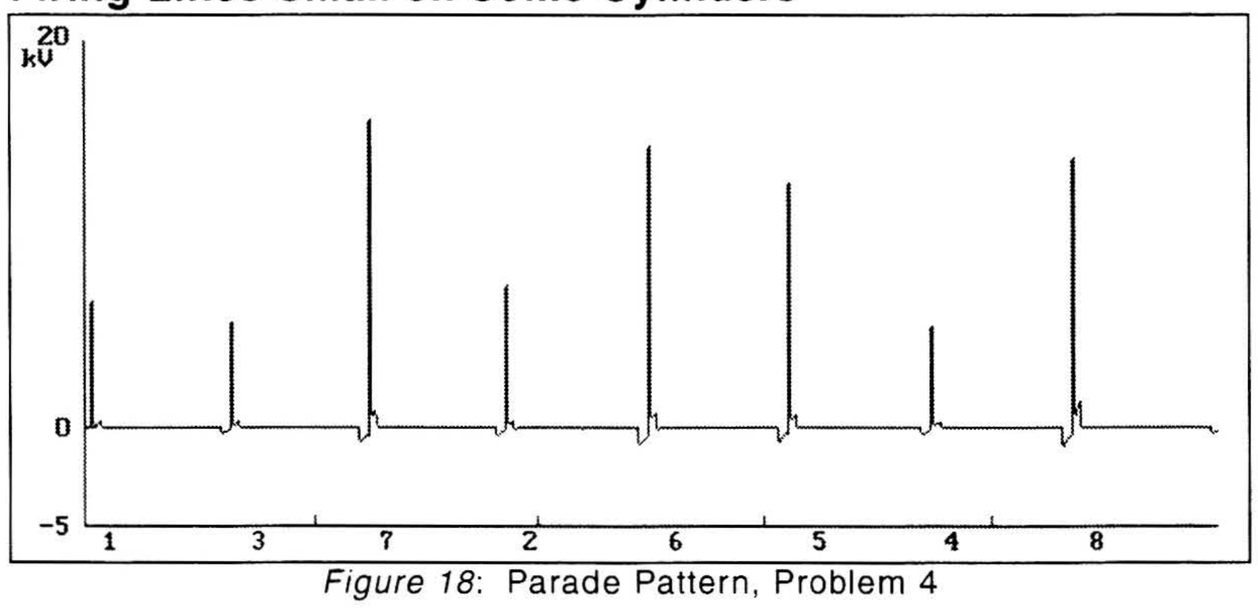


Figure 18: Parade Pattern, Problem 4

Solution, Problem 4

- — Check all secondary pickups.
- — Pickups are directional with sides marked "A" and "B." Refer to *Application Chart* on page *COP-8* to determine which side of the pickup should face the coil.
- — Pickups must contact each coil in the same place for consistent test results.
- — Gain settings are "typical" in the *Application Chart* and may need to be adjusted depending on the exact location of pickup and if non-OEM coils have been substituted.

✓ Aftermarket coils may exhibit stronger or weaker signals than OEM coils due to the location of the windings inside of the coil. This difference in itself does not indicate a bad coil, but must be taken considered when diagnosing the vehicle.

Problem 5

Pattern Shifts Above or Below the Zero Line

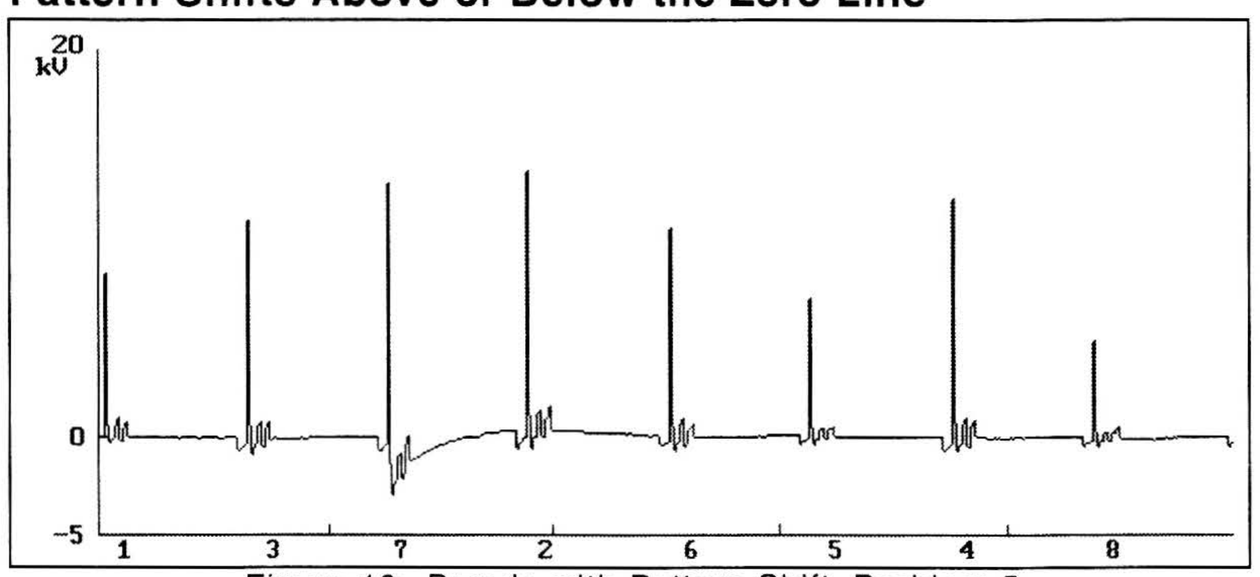


Figure 19: Parade with Pattern Shift, Problem 5

Patterns like the one in *Figure 19* are not typically caused by a vehicle problem and are more often related to how the signal is detected by the pickup.

- — To determine if there is a vehicle problem, check the firing section of the shifted cylinder in a parade, .5 ms or a single cylinder view.

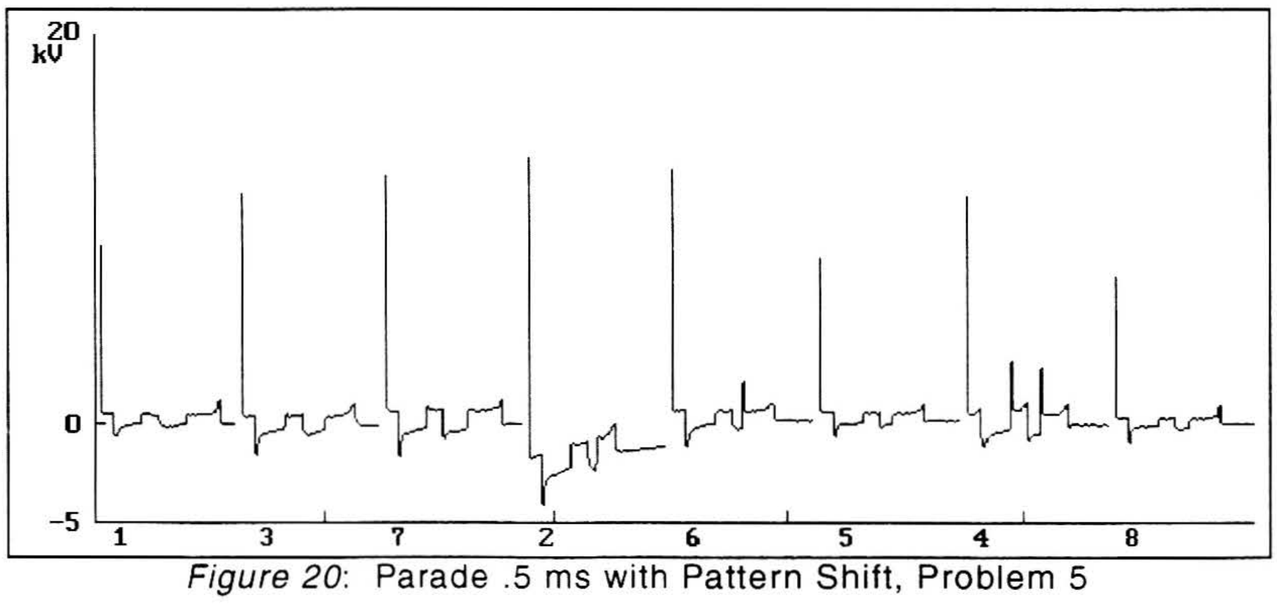


Figure 20: Parade .5 ms with Pattern Shift, Problem 5

A closer look at the firing section of the shifted cylinder in *Figure 20* shows that the pattern jumped from the zero line but the spark duration did not change.

Solution, Problem 5

Since there was not a corresponding change in spark duration when the pattern shifted, no vehicle problem is indicated.

✓ Because spark duration and voltage are related, any system problem that affects one, affects the other.
- — If spark voltage increases, spark duration decreases.
- — If spark voltage decreases, spark duration increases.

✓ If the pattern shifts from the zero line, digital measurements and bar graphs will show a wide variation between minimum and maximum readings.

Problem 6

Triggering Problem

Unstable Patterns at Any Speed Including Cranking

Error Messages Displayed During Testing

- — Check the raster pattern at the problem speed. If any or all of the cylinder firings shift away from the left side of the screen as shown in *Figure 21* and *Figure 22* the gain may be set too high.

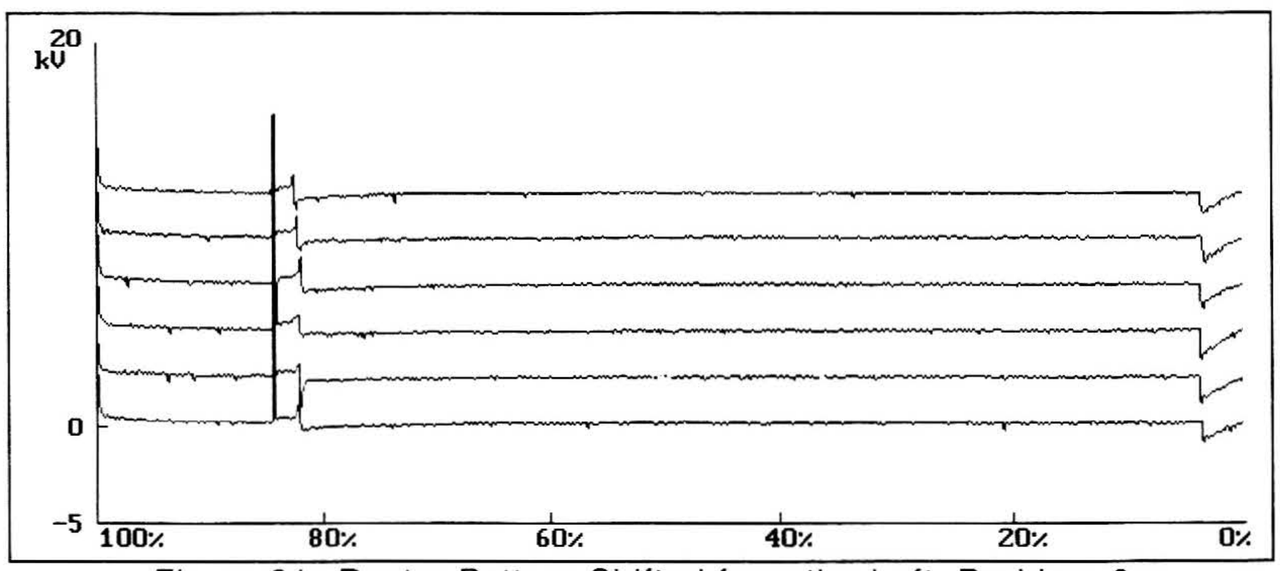


Figure 21: Raster Pattern Shifted from the Left, Problem 6

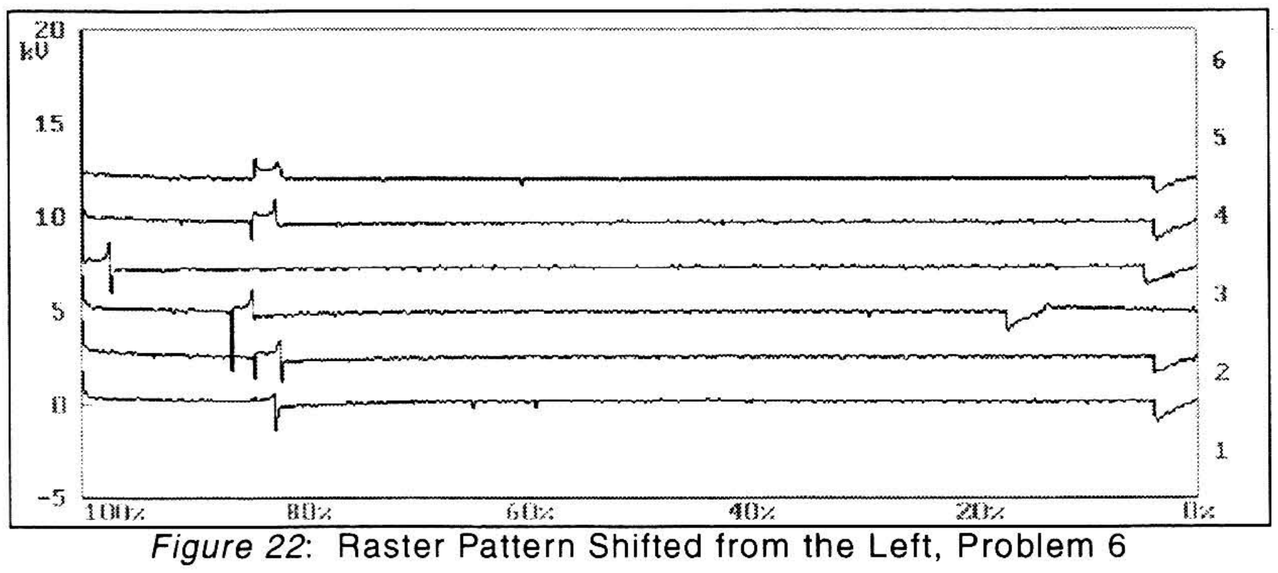


Figure 22: Raster Pattern Shifted from the Left, Problem 6

Solution, Problem 6

— Decrease gain until the firing lines display correctly at the left side of the screen while viewing a raster pattern at the problem speed.

✓ *Figure 21* and *Figure 22* are examples of gain set a little too high. With engine running, no problems were evident. When performing a cranking test, the tester displayed a "data out of Sync" message at the end of the test.

Ignition Waveform Description

Description of the secondary ignition waveform and circuit operation must include the relationship and interaction between the primary and secondary ignition circuits.

The waveforms in *Figure 23* start with a firing line on the left at 4, continue through the phases of ignition system operation, and end with the beginning of another firing line on the right (4). However, the actual ignition cycle for a cylinder should be considered from primary turn-on (1) to primary turn-on. Therefore, the description and explanation of the waveforms begins just before primary turn-on at 9.

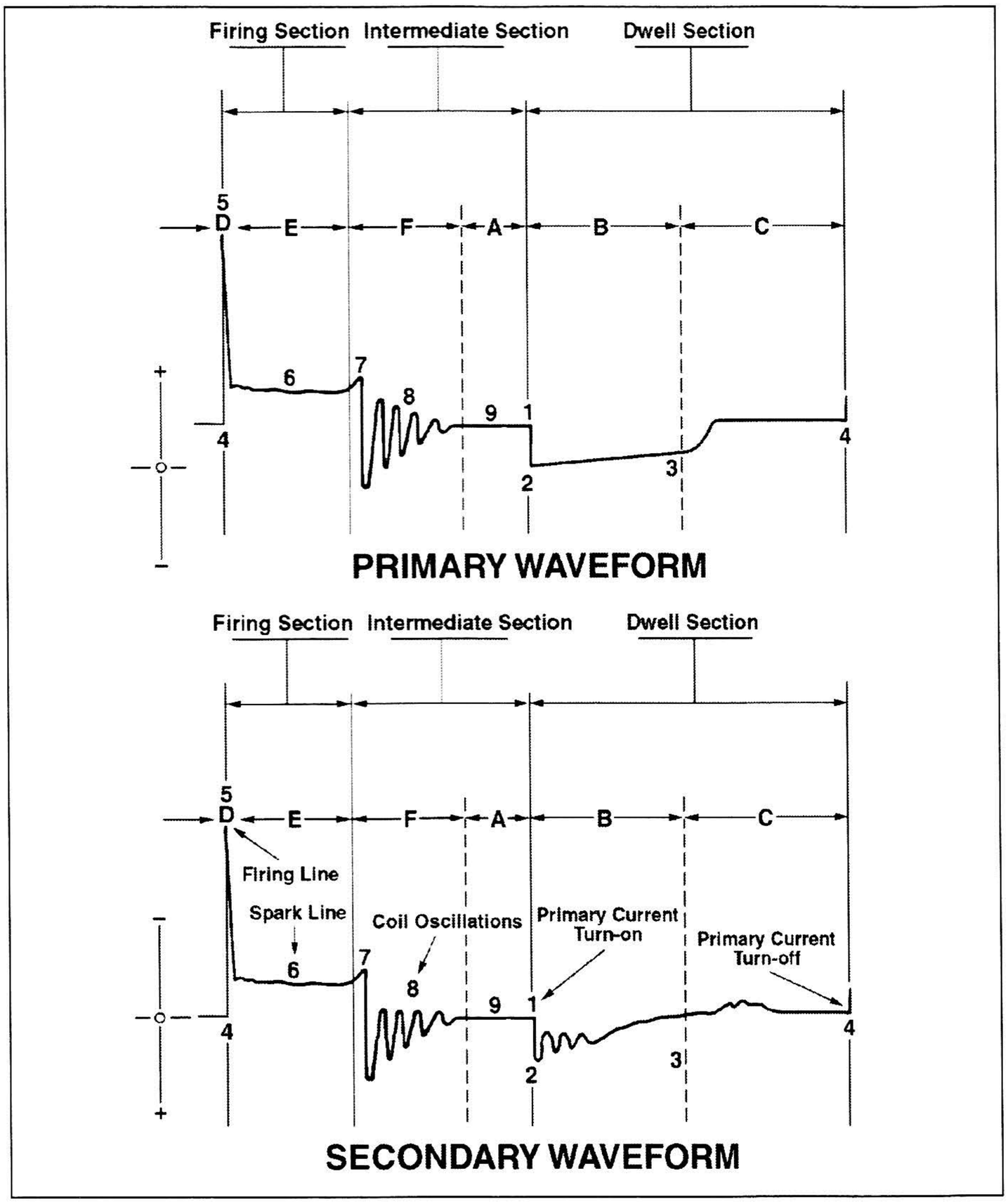


Figure 23: Ignition Circuit Waveforms

The waveforms have three basic sections labeled Firing Section, Intermediate Section and Dwell Section.

The waveforms are also lettered (A–F) and numbered (1–9) to identify portions of sections or locations on the waveform for the following description of ignition system operation.

This description of the waveforms includes the dwell portion (3) from primary turn-on (1) to primary turn-off (4). Numbers 1–9 refer to the numbered points in *Figure 23*.

9

No current flows in the primary ignition circuit. Battery or charging system voltage available at this point is approximately 12–15 volts.

1

The primary switching device turns on the primary current to start the dwell period.

2

Current flows through the primary circuit, establishing a magnetic field in the ignition coil windings.

3

Represents (from 1–4) the dwell period (cam angle on breaker point ignition systems) or "on-time" of the ignition coil primary current.

- The rise in voltage along 3 indicates that current limiting is occurring.
- On ignition systems that use current limiting to control coil current, a current hump or voltage ripple appears on the portion of the waveform representing primary circuit on-time (between points 1 and 4, designated by 3).

4

The primary switching device stops the primary current flow suddenly. The magnetic field that had built up collapses suddenly. This induces a high voltage in the primary winding by self-induction.

5

An even higher voltage is induced, by mutual induction, into the secondary winding, because of the 1–100 primary to secondary turns ratio. The secondary voltage overcomes the resistances in the secondary circuit up to the spark plug gap. The spark plug gap is ionized and current arcs across the electrodes to produce the spark that initiates combustion.

6

Voltage reduced to about 1/100th of the secondary voltage, because of the 100 to 1 step-down ratio. This is the actual discharge across the air gap between the spark plug electrodes.

7

The coil energy is no longer able to sustain the spark across the electrodes.

8

An oscillating voltage results (in step with the secondary voltage) because of the 100 to 1 step-down ratio.

9

Coil energy is dissipated. There is no current flow in the primary circuit. Battery or charging system voltage available at this point is approximately 12–15 volts.

The ignition cycle for one cylinder is now completed, and the cycle repeats itself for the next cylinder in the firing order.

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Coil-Over-Plug Adaptor Kit

ZEEIG100A Rev A